DOCUMENT RESUME

ED 241 900 CS 007 535

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TITLE Visual Interest in Picture-Text Combination. Period February 1, 1980-January 31, 1982, Final Report.
INSTITUTION Columbia Univ., New York, N.Y.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
PUB DATE [82]
GRANT NIE-G-80-0029
NOTE 17p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Processes; Eye Movements; Higher Education; *Illustrations; Layout (Publications); Reading Attitudes; Reading Comprehension; Reading Improvement; Reading Interests; *Reading Materials; Reading Rate; *Reading Research; *Research Methodology; *Visual Perception
IDENTIFIERS *Picture Text Relationship; Reader Text Relationship

ABSTRACT

Undertaken as part of a larger study, the experiments described in this report examine various aspects of the relationship between pictures and text and of the methodology for examining that relationship. Each of the 11 experiments described in the report involved college students and deals with the effects of storyline and texture on the reading rates and ratings of short stories, the effects of picture/text balance on reading choice and ratings in picture/text combinations, and the effects of storyline and nonstoryline pictures on "batch copying" and eye movements and pictoral complexity. The report indicates that data are not yet completely analyzed from the experiments, but that so far they indicate that (1) students were able to make a distinction between storyline and texture, (2) the distinctions differed when made online and when made after reading an entire text, (3) differences in structural category had reliable consequences for reading rate and students' liking for or disliking of a story, and that (4) the batch copy method can be an important tool in the study of picture-text interaction and, possibly, for the assessment of picture-text combinations. (FL)

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Visual Interest in Picture-Text Combination.

Final Report for the Period February 1, 1980-January 31, 1982.

Julian Hochberg

CS007 535

Visual Interest in Picture-Text Combinations

It seems evident from any consideration of the popularity of comic books, illustrated magazines, and other sources, that pictures and text in combination sustain viewer interest much better than either pictures or text alone. Despite the apparent importance of this relationship between pictures and text, no precise means of demonstrating or studying it has been fully developed.

The inquiry in this grant has three main goals: (a) To apply and test recently devised techniques of measurment and analysis in experimental studies of how adults and children distribute their attention within stories presented by picture and text; (b) To test hypotheses about interest mainenance-in such stories; and (c) To attempt to formulate principles that will permit the design of picture-text combinations that both maintain the interest of the viewer/reader and motivate the acquisition of reading skills.

This work promises to discover principles that govern the optimal presentation of pictures and text. This knowledge could increase the amount both children and adults read and thus increase their reading skills, particularly in populations where existing reading skills are currently weaker.

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Project No: NIE-G-80-0029

Start Date: Feb. 1/80

End Date: Jan. 31/82

Funding: FY 80 $ 35 K
FY 81 $ 40 K

FINAL REPORT

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Final report, NIE G-80-0029

Introduction

Four classes of experiments were performed in the final portion of this project: The effects of storyline and texture on the reading rates and ratings of short stories, the effects of picture/text balance on reading choice and ratings in picture-text combinations (modified "comic books"), the effects of storyline and nonstoryline pictures on batch copying, and eyemovement studies of the effect of pictorial complexity on looking time. The principle investigator and five graduate students (Susan Virostek, Dale Klopfer, Mary Peterson, Leslie Besunder, and Leora Amira) participated in this research. The data of the last set of experiments is still being analyzed, for reasons discussed in connection with Experiments 9a-c. We consider the first three sets of experiments in turn.

Experiments on storyline and texture

Eight full experiments (and several pilots) were run on the measurement and effects of storyline (or subjective outcome structure) and texture in short fiction, read for pleasure (i.e., not in preparation for subsequent memorization or comprehension tests).

Rationale: It is unlikely that bare description of events and plots, without detail to provide verisimilitude, will engage and maintain reader interest; on the other hand, mere descriptive texture will not sustain interest as does an unfolding event with definite course and outcome. In what follows, structural category refers to whether a unit of text (sentence, paragraph) is classed as storyline or texture. This nonhierarchical structual distinction (Hochberg, 1978; Virostek, 1981,1982) is not related in any clear way to the story grammars of such psychologists as Kintsch, Anderson, Rumelart, and Mandler, inasmuch as these are concerned with story structure as it affects the organization of memory, and our concerns are only whether the reader places any item more in one category than the other. The present structural distinction however is close to such literary analyses as those of Culler and Barthes: the latter however attribute to naive readers on their first reading the distinctions they themselves find by considered analysis after completing the text. As psychologists concerned with the different status and consequences of texture and storyline, we cannot merely assume that considered and online analyses of text are equivalent: It is

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an empirical matter, and if these methods should turn out to provide different results, it is the online judgment that concerns us.

Most important, psychologists' story grammars are expensive and laborious to apply to anything but the shortest selection. If the storyline/texture distinction is reliable, and has any predictive value, it should be applicable to far longer selections, with far less labor.

Experiment 1

Purposes: (a) to test the reliability of judgments of storyline vs. texture: (b) to determine whether online and considered analyses yield the same judgments.

Subjects: Twenty college students.

Procedure: (a) Online: subjects judged each paragraph in context, in each of four stories (ca. 2000 words each), according to the liklihood that it was related to outcome. (b) Considered: Subjects read stories without interruption, then ordered the paragraph (separately on cards) in terms of importance to plot summary.

Results: (a) Interrater reliabilities ranged from .79 (13 paragraphs) to .93 (with 14 paragraphs), $p < .001$ for all stories. (b) Firedman's chi square ranged from 50.4 to 185.4, $p < .001$ for all stories. Online ratings were higher than considered ratings ($t = 4.5$, $p < .001$). Moreover, 21 of 65 paragraphs were rated significantly differently on the two procedures.

Discussion: (1) The distinction between storyline and texture is a reliable one, subject to the obvious cautions about generalization. (2) Online and considered judgment of this distinction cannot be assumed to yield the same results. We use online judgments in all that follows.

Experiment 2

Reading rate has been taken as a measure of interest, and (orthogonally) as a function of comprehension (e.g., the time taken to relate each element to the macrostructure the reader has been presumed to assemble: see Shebilske). A developed theory of the role of texture and storyline would also have things to say about reading rate, and of reading rate as a function of story stage as well (e.g., texture would be important at the beginning of the story, in getting the reader engaged; once engaged, the reader would become

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more concerned with outcome).

Purpose: To determine how reading rate varies with structural category at different story stages (i.e., time course).

Subjects: Eight new subjects.

Procedure: Subjects read the stories rated for structural category in Experiment 1. They were instructed to read for pleasure, and that there would be neither a memory nor a comprehension test, but rather a subjective repsonse sheet after each story. Reading rates were measured for individual paragraphs in context, and were analyzed as a function of structural category of paragraph, for different stages of story.

Results: Story lines peaked faster at the middle stages ($F(2,35)=14.1$, $p<.001$). This is against the expectation that readers attend selectively to storyline, once engaged. One possible explanation is that paragraph means obscured the fact that some targets were identified as storyline on the basis of a sentence or so embedded in what were otherwise textural sentences. Experiment 3 was addressed to this point.

Experiment 3

Purposes: To replicate experiments 1(a) and 2, using sentences as the units.

Subjects and Procedures: Ten new subjects were used for rating the sentences as to structural category, and 20 new subjects were used to measure reading rate.

Results: The same interaction was found between structural category and story stage: ($F=9.8$, $p<.005$). This time, however, storyline rates were faster both at the middle stage ($F=8.1$, $p<.001$) and at the end stage ($F=40.5$, $p<.001$).

Discussion: To test the possibility that storyline sentences are easier to read (i.e., are shorter or simpler), they were compared to texture sentences according to number of clauses, number of words, and number of new argument nouns, but results were entirely negative. A tentative hypothesis is that storyline sentences were faster because they are more predictable, given the subjects' literary competence (i.e., knowledge about the logic of human actions and about narrative convention).

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Experiment 4.

The rating experiments in exp.1 and 2 showed that "storyline-end" sentences and paragraphs were disproportionately numerous among the targets about which subjects agreed. We would have expected the "texture-beginning" cell to be over-represented because story settings are primarilly texture, as we have defined it. The number of targets in the sample thus far described was too small, so an ecological survey was undertaken to provide a larger sample by a definable method.

Purpose: To perform an ecological survey of the distribution of storyline and texture.

Procedure: For several reasons, 1948 was selected as a year in which anthologies would present the mature form of the short story. The Cumulative Book Index for that year yielded 98 collections published in the U.S.; the Union Serials Catalog provided locations of the volumes available in N.Y. and Connecticut. Approximate word counts were made of each of the 244 stories in those 10 volumes. From that distribution, 10 stories bracketing the median of the distribution were chosen, of about 4000 words in length.

Three raters used the procedures of Exps.1(a) and 4, judging on a scale of 1 to 5 the liklihood that individual paragraphs would be related to the outcome. An alpha of .13 was used as the criterion for target selection. Proportion of target elements to total number of elements in each story was calcualted for an ANOVA of the variance on the structural category by story stage distribution of the incidence of paragraphs reaching criterion.

There were more texture targets than storyline targets in these stories ($p<.001$), but there was no affect of stage. These stimuli were used as the basis for the next experiment.

Experiment 5

Purpose: To replicate Experiment 2, using the extended, representative sample obtained in Experiment 4: Three stories, selected from the 10 on the basis of their interrater reliabilities, proportion of storyline and texture, and flat distribution of storyline targets over story stages.

Discussion: The longer (4000 words) stories had an approximately even storyline course, and the shorter stories (2000 words) seemed to have an increasing incidence of

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storyline. This raises two questions about our results to this point: (a) Do short stories differ from longer ones in the storyline distribution?. (b) Is the distribution of reading rates over time related to the distribution of storyline ratings? Experiment six addressed the first of these questions.

Experiment 6

Purpose and Procedure: The same three judges used in Experiment 4, and three new judges, analyzed ten new stories drawn from around the boundary of the first quartile of the word count distribution; each was approximately 2000 words long.

Results: For the first three raters, the same main effect for structural category obtained as in Experiment 4 ($F(1,45)=7.12, p<.02$). In addition, the same interaction of structural category and story stage that had earlier been obtained, such that the proportion of texture was greatest at the beginning, obtained here as well ($F(2,45)=4.8$. $.05>p>.01$). When considering mean paragraph rating per stage (over three raters) linear trend component analysis showed that storyline ratings tend to increase more steeply over story course in the shorter (2000 word) stories ($p<.05$).

Because the raters received all stories in the same order, these data might reflect an order effect. Therefore a substantial subset of the 2000 and 4000 word stories resulting from Experiment 4 were analyzed by three other raters, in randomized order. A virtually identical pattern of results emerged.

Discussion and Conclusions: Storyline distributions by stage do tend to be different for shorter (2000) word stories than for longer ones (4000 words). The next question raised by the results of Experiment 5 is whether stories of the same length which have different storyline distributions by stage result in different reading rates over time.

Experiment 7

Purpose: To determine whether story type (storyline distribution over story stage), with length held constant, affects the time course of reading rate.

Subjects and Procedure: Ten new judges using the procedures of Experiment 1a rated four new stories so selected from the survey of Experiment 4 as to provide two stories which were even in their storyline distribution ("even stories") and

two which increased toward the end ("culminating stories"). Twentyfive subjects provided reading rate data, using the procedures of Experiment 2.

Results: Storyline reading rates for cluminating stories increased over stages, whereas rates for even stories decreased ($F=17.3$, $p<.001$).

Discussion: A possible explanation for this result is that it is storyline that is primarily engaging to the reader, in culminating stories: readers read to discover the outcome. In even stories, however, the point of reading is itself more the interweaving of texture and story line. Subsequent research will address this possibility.

Ratings of how much the readers liked the stories had been obtained in all of the reading experiments, but few negative ratings had been obtained. In this experiment, enough subjects disliked one of the stories to permit analysis of patterns of reading rate according to how well the story was liked. As expected, slower reading rates were associated with positive reactions (by subjects, $t(21)=-1.6$, $p<.07$: by paragraphs, $t(37)=-9.8$, $p<.001$). Item analysis by paragraphs showed that the storyline/texture distinction was not systematically related to reading rate patterns according to likeability ratings.

A decrease of reading rates over the course of the even stories was obtained for the first time in this experiment. The next experiment was addressed to this finding.

Experiment 8

Purpose: To determine whether the even stories in Experiment 7 were particularly difficult for readers to construct as stories.

Subjects and Procedure: Twelve subjects read the four stories that had been used in Experiment 7, under the isntructions to note whatever hypotheses they had concerning what might happen at the outcome of the story, indicating each hypothesis at the point of its occurrence.

Results: First hypothesis for the even stories occurred later than in culminating stories: Taking as our measure the ratio of the paragraph number of the first hypothesis to the total number of paragraphs in that story, the mean ratio for even stories was .59, for culminating stories it was .29 ($F(1,35)=23.5$, $p<.001$).

Discussion and Conclusions: Stories with even storyline

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development do appear to be more difficult to assign hypothetical outcomes (in the sense that subjects do not assign them until later in the story) than do culminating stories. The decreasing reading rate with increasing story stage that was found with such stories in Experiment 7 presumably reflects this fact, i.e., reflects the lesser clarity of subjective outcome structure in the even stories. Even and culminating stories should display other characteristic differences, which await further research.

Overall conclusions:

The distinction between storyline and texture is one that is reliably made by judges; it differs when made online or after reading the entire text; and the distribution of these components over the course of the story differs with story length and with individual story. These differences in structual category have reliable consequence for reading rate, and appear to interact with viewer's liking for, or dislike of the story, and with the clarity of subjective outcome structure.

This methodology and structural analysis seems to us to be worthy of further research in the determinants of reading-maintenance of natural material. Further (parallel) use of was made of this underlying approach in the other research discussed below.

Experiments on picture-text interaction

Four full experiments were completed in this section, although the eye movement data are still incompletely analyzed in Experiments 9a and 9b. This is so because the equipment failed and could not be repaired in time, so that the eyemovement data were gathered late, and in a form for which analysis is very time consuming. Those data are still being analyzed; however, there are things that can be said now about the results of these two experiments, and the other experiments in this section were so designed as to avoid these measurement methods.

Stimuli for Experiments 9a-c

In the report for the first year, the need for more intrinsically engaging picture-text combinations was described. To this end, an extended pool of seven stories was constructed. All of these were derived from "comic book" style illustrated stories based on characters originally presented in printed novel form, so that for at least some of the stories used a book form existed and was consulted.

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These comprised two "Conan" stories, three "Tarzan" stories, "Captains Courageous", and "First Men in the Moon." Panels (pictures, from which all text and dialog was deleted) were mounted on the top halves of large sheets of paper; the text was presented beneath each panel. Six versions of each story were prepared, as follows. A: full set of pictures with expanded text (augmented by innocuous padding, done after reading original text where available); B: full set of pictures, with reduced text (reduced by cutting redundancy from text, and eliminating any narrative that is already conveyed by the picture set); C: Half the original set of pictures, retaining all those needed to provide whatever was removed from the reduced text in B, and in general selectively deleting the least informative pictures; D: the picture set used in C, and the text used in B. In addition, two versions of each story were prepared in which only 1/4 of the pictures were included, and the text of version A and C was used: E, in which the pictures retained were those that advanced the storyline, and F, in which pictures retained did not advance the storyline. Finally, a seventh version, G, was prepared for four of the stories ("Captains Courageous;" "Sumo" and "Golden Girl",both Tarzan stories; and "Conan") in which no pictures at all were used.

In the following three studies, versions A and C varied from 90 to 350 words per page, with a mean of 228; version B and D varied from 15 to 98 words per page, with a mean of 75. Numbers of pages varied from 20 to 65 in the A and C versions, with a mean of 35, and from 20 to 65 in the B and D versions, with a mean of 38. There were generally 4 pictures per page in the A and C versions, and 1 or two in the B and D versions. (The G version, in Exp.9b, had no pictures.)

Experiment 9a

Purpose: To measure the effects of the three primary manipulations (version A-D) on story ratings, on story choice for subsequent reading, and on looking behavior (division between panels and text) as inobtrusively measured in the course of reading.

Subjects: Twenty undergraduates, initially naive as to the purpose of the experiment.

Procedures: As in most of the experiments in this series, subjects were told that the study was an inquiry into what makes picture-story combinations more or less interesting or enjoyable to read and look at, and that it is not a test or an experiment on memory, and that pupil size would be

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recorded during the experiment as a possible measure of interest. They were given a booklet and asked to look at a few pages at their own pace, so as to have some idea about how interested they would be in looking at the rest of that story. Which version they received of each story was varied between subjects. After having looked at a few pages of each story in the experiment, they could return to whichever one they would most like to continue. If interest waned in what they were reading, they were to turn to another story, or even to change the study.

In any case, before the end of the session, questionnaires were administered to all subjects. Throughout the reading period, gaze direction was recorded by a relatively inobtrusive video camera procedure, adequate for distinguishing whether the reader was looking at the top (pictures) or the bottom (text) on each page, which side of the booklet the subject was looking at, and when the page was turned. We thus had three kinds of records: The choice of which story to read; how long each story was read, both during the initial phase and on later reading, if it was chosen; the ratings given each story; and the looking behavior manifested during the reading.

Results: The looking behavior records are still being analyzed, and it may well be that they are informative as to differences in interest-maintenance.

Stories were grouped as to version (A,B,C, or D). The choices made for subsequent reading, and the rating measures (including magnitude estimation) were pooled across stories within these versions. We can say flatly that no differences even approaching significance were obtained in either measure.

Experiments 9b,c.

These were partial replications and variations of 9a. In 9b, eight subjects followed the procedures of 9a, except that version G was substituted for B. In 9c, only questionnaires were used, and no recording procedure was attempted. Again, no differences were obtained between versions once the stories were pooled.

Discussion and Conclusions for Experiments 9a-c: It seems likely from inspection that the eye movement records will provide useful information about the effects of pictures and text on interest-maintenance, but we do not yet have them analysed. As far as the existing measures are concerned, the

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major problem appears to be that the differences in interestingness of the different stories swamped any differential effect of version that might otherwise have been manifest.

We needed therefore to devise a procedure by which all readers would look at all versions of each story. The next experiment was addressed to that point.

Picture-text balance and storyline/text balance

Experiment 10: Effects on looking time and choice in a "cafeteria" situation.

With the results of Experiments 1 and 2 in mind, and those of Experiments 9a-c incompletely analyzed but indicating that comparing versions across different stories is not feasible because of the variance introduced by the latter, we undertook the following experiment. In this method, no physical constraints whatsoever are placed on the subject, and it should be usable with almost any class of subject.

The subject in this experiment was asked to read three pages of each of the versions of each story, and to choose between them according to the interest engendered by each version of the same story. They would, we assumed, be able to continue reading their choices after sampling all of the versions of all of the stories. As it turned out, there was no time at the end to do any further reading, but we did not know that when the experiment was planned, and the subjects did not know that when they made their choices, so that those choices most probably mean what they appear to.

In that way, it was hopd, the effects of the variance introduced by the different interest values of the individual stories, which tended to swamp the effects of treatment in the earlier experiments, would be reduced.

No attempt was made in this procedure to separate all of the possible determinants of choice, but rather to determine whether what should theoretically represent some extreme combinations have demonstrably different effects on looking time, choice, or both.

Purpose: To determine whether differences in picture/text and in storlyline/text balance affect subject's overt forced choices and covertly measured free reading times.

Subjects: Twenty-one undergraduate students at Columbia and Barnard Colleges, naive as to the detailed purposes of the

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research.

Materials and Equipment: Each of seven basic illustrated stories ("comics"), taken from the pool developed and used in earlier experiments and pilot experiments were prepared in each of 4 versions: (A) Full complement of pictures, expanded text (text roughly doubled by innocuous redundancy); (B) Full complement of pictures, reduced text (text cut roughly in half, pared to reduce redundancy); (E) Reduced, storyline pictures (i.e., roughly one quarter of the pictures in the story, so chosen as to include those pictures that advance the story) and expanded text; (F) Reduced, nonstoryline pictures (chosen to exclude those pictures that advance the story). In this experiment, text in versions A,E and F ranged from 91 to 343 words per page, with a mean of 227. Text in version B ranged from 21 to 91 words per page, with a mean of 67.

Stories were arranged in large looseleaf books, hinged at the top, with the pictures in the top half of the pages and the text beneath. Books were arranged in 4 piles on a long table. Each pile represented a particular condition (A, B, E, or F), with each of the stories in sequence in the pile. Stories were rotated within each pile between subjects. The subject was told that this was a study of what makes picture-story combinations more or less interesting or enjoyable to read and look at, and not a test of memory. The subject was to read each of the versions up to three pages, the point at which the interestingness of that version was clear, and then go on to another version. They were informed that, if time permitted, they would get to finish any story desired. Versions of the story were compared pairwise, A vs. B, E vs. F, and the two "winners" were then compared.

The experimenter inobtrusively kept track of the time each subject spent with each version of each story, and recorded the subject's verbalized choices

Results: Subjects differed widely in their reading times. Fourteen finished the comparion reading of all versions for all seven store. For those Ss, the different versions received significantly different reading times ($F(3,39) = 4.1$, $p < .05$), with A versions averaging longest, B versions shortest, and E and F intermediate.
Times for A and E were significantly greater than those for B and C_9 respectively ($t(A-B)=13.3, p<.001$; $t(F-E)=2.45$, $p<.025$). Times for A were not significantly greater ($t=1.01$) than for E.

In the forced choice between A and B, subjects chose A

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significantly over B (t= 2.49,p<.025) and E over F (t=7.09, p<001). In the forced choice between the first choices, 20 of the 21 subjects made one or more choice between an A and a E version; for 18 of those, A was chosen more than E, and for 17, A was always chosen over E. The order of preference then was clearly A and E over B and F, respectively.

Discussion and Conclusions: The manipulation of reducing text in version B compared to A clearly speeded up the reading time (from 44 to 19 seconds per page), but that was not reflected in choice of the reduced-text version, with this population of stories and viewers; quite the contrary. The choice of nonstoryline pictures in version F slightly but significantly increased the reading time per page relative to E (39 vs. 34 seconds, p<.025), as might be expected inasmuch as less information about the story was being provided by the picture. The effect on preference was very marked, even though (see Results), even though the same number of pictures and the same text was used.

The distinction between nonstoryline and storyline clear applies to pictures in two ways, only one of which was manipulated in this experiment: Pictures differ in the degree to which they present texture irrelevant to bare event they depict; although we as yet have no evidence to that point, we believe that such textural detail is an important source of engagement and versimilitude (serving different functions at different stages of the story (see Experiments 1 - 8), and perhaps the eye movement analyses of Experiments 9a,b will provide evidence to that point when they are completed. Pictures also differ in the degree to which they illustrate parts of the event structure (regardless of their pictorial detail) that is relevant to, and informative about storyline. That is what we tried (apparently successfully) to manipulate here. In order to exploit this component of picture-text interaction, and indeed to demonstrate it, we need some more formal method of identifying the degree to which a given set of pictures contributes to the reader's comprehension of the story.

The last experiment was addressed to that point.

Experiment 11.

Introduction: Rothkopf has shown that the average amount that a subject can copy from a text, without viewing the text while writing out the copy, is related to other measures of comprehension. That measure would perhaps reflect the relatedness or "chunkability" of the text. To the degree

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that a picture serves to help organize or make more rapidly meaningful a selection of text, it should increase the amount that the subject can copy at one time, or in one "batch. Unlike comprehension tests, which can only be used within the body of a story by interrupting the flow of the story by a grossly different activity, this batch-copying measure would, if it works for our purposes, provide a relatively nondisrupting measure of the effect of a particular set of picture on the comprehension of the text.

Purpose: To devise and test a a nondisruptive measure of the contribution of pictures to the processing of text.

Subjects and Procedure: Eight undergraduate students were each given three stories to read, and aksed to copy the story in comfortable batches to a pad of paper, not looking at the story during the actual copying procedure. A new page on the pad was started with each batch of copying, making it simple to measure batch size.

Each subject was given 3 stories, taken from the pool in Experiment 10, to read and copy. Subjects were distributed through 4 experimental orders and comprising two conditions: All read the same version (B: see Experiment 10) of "First Men in the Moon;" half read version A (Full set of pictures and exparded text) of "Captains Courageous" and version F (1/4 of the pictures, selected to be nonstoryline) of "Sign of Sumo," and the other half read version A of "Sign of Sumo," and version F of "Captains Couragoues."

Scores analyzed here were the words per page in each story for each subject

Results: Subtracting each subject's average F version story score from his or her average A version story score showed the latter significantly larger (mean= 4.6, $t=2.80$, $p<.025$); dividing that difference in each case by the reader's score on the B version story, common to all, did not change matters greatly (i.e., t was then 2.9).

Discussion and Conclusions: The batch-copying method does appear to measure the lesser contribution to text organization made by the nonstoryline, (reduced) set of pictures, version F, as compared to the full set (version A). If the results had turned out the other way, they might have been attributed to the greater number of pictures to distract attention and load memory in the A versions (it will be remembered that in Experiment 10, A versions, averaged across stories, were not read faster than F

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versions -- indeed, A took nonsignifantly longer (t=1.01) than F to read), but that is not what happened. It looks as though the batch copy method will provide an important tool in the study of picture-text interaction, and may (because of its nondisruptive nature) be of value for the practical assessment of picture-text combinations as well.

Because this study used a relatively small number of subjects, however, and a very small set of stimuli, we must consider these results as still only tentative; it may well be that when it comes to averaging across any larger number of different stories to compare version, the difficulties encountered in Experiments 9a-c will prevail. We are now setting up a more extended replication.

Publications and future plans.

Publications are being readied for those experiments in which data analysis is complete (1-8, 10), and copies will be provided when they are submitted to press. Three of these have already been read as papers at EPA conventions, one has been included in a paper read at the Psychonomic Society, and still another has been submitted to the this year's EPA program committee. If Experiment 11, which is being repeated in an expanded version, replicates, a new research proposal will be submitted to continue the inquiry with the methods of Experiments 10 and 11. In any case, after Experiment 8 has been replicated and the eyemovement data of Experiment 9a analyzed, a shorter version of this report, with the long abstracts of each of the EPA papers, will be distributed to interested parties.

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